International seminar on ” Improvement of Energy Efficiency of Buildings”

5th of October 2005,
Hotel Palace, Helsinki

ThermoNet System

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Group VP Technology
Fläkt Woods Group

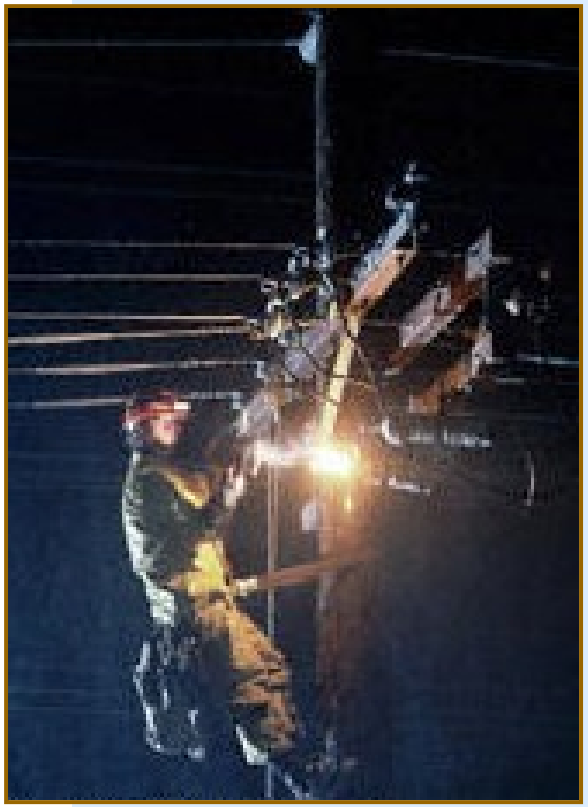
Agenda

- FläktWoods Group in short
- ThermoNet Innovation
- Impacts on the BES le
- Business Evidence

Importance of Energy

Business processes are reengineered.
Enterprise resources are planned.
Total quality is managed.
The supply chain is automated.
The corporation is right-sized.
Taxes are minimized.
HR is online.

Energy costs… are merely tolerated even if they can be the third or fourth largest enterprise cost!



Fläkt Woods Group

We are committed to be the leading provider of ventilation products and services for Buildings and Industry

Buildings

- Clean and fresh air for people to live
- Comfort at work or in public areas

Industry

- Efficiency and reliability of equipment and processes ventilated or cooled by our products

Air Climate

• No 1 in Europe for Air Handling Units

• No 2 in Europe for Air Diffusion products

Air Movement

• No 1 worldwide for metro fan

• No 1 in traction fans leading for axial and industrial fans

Fläkt Woods Group

Local presence for products and services

- 100 sales offices and 80 representatives in 95 countries
- Own engineering and manufacturing operations in 18 countries:

- **Sweden**
- **Finland**
- **United Kingdom**
- **Ireland**
- **France**
- **Italy**
- **Belgium**
- **Spain**
- **Poland**
- **Russia**
- **Dubai**
- **India**
- **Korea**
- **Japan**
- **Australia**
- **South Africa**
- **USA**
- **Canada**

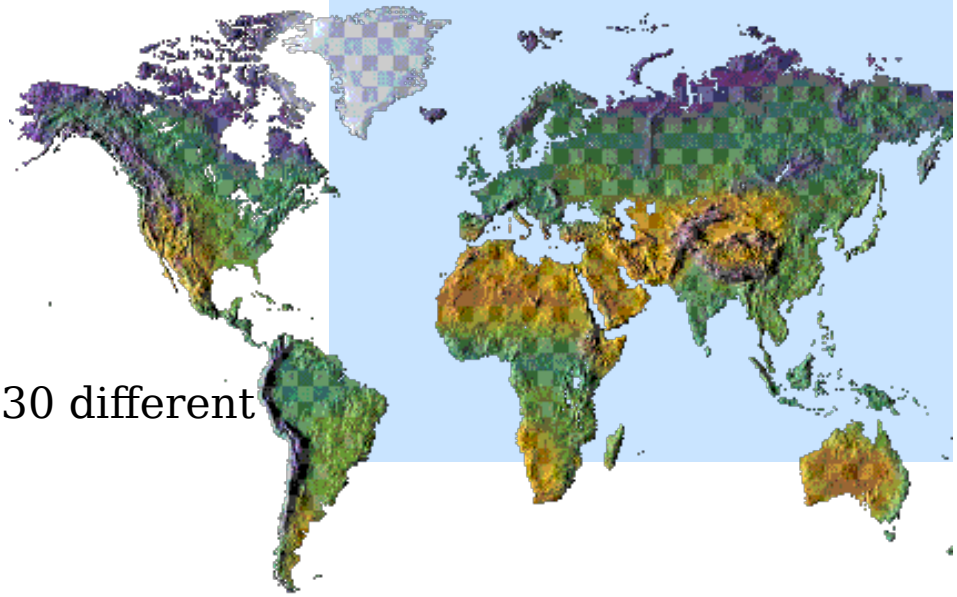
- Our 3200 employees represent 30 different nationalities
- Turn over 500 M€

Fläkt Woods was formed in 2002 out of a merger of two companies:

• **Fläkt** - a specialist in air handling, fans and air climate.

• **Woods** - a global leader in axial fans.

Fläkt Woods is a privately held company owned by Compass Partners and the management

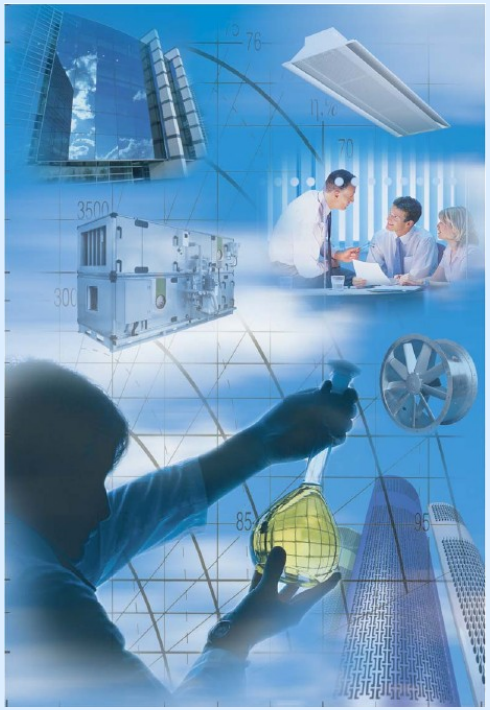


Air Climate for Every Application

Fläkt Woods Group is the only air climate company to provide end-to-end solutions.

Some examples of Fläkt Woods experience in Buildings:

- 200 000 buildings in 50 countries are equipped with FWG air handling units
- 50 000 km of our ducts convey air in 25 countries
- 30 million air terminal devices distribute air in buildings
- 80 000 buildings in the UK have fans for fire safety or ventilation



Fläkt Woods is a specialist in Air Climate and Air Ventilation, offering the most comprehensive range of components, products and solutions.

What makes us different and unique for our customers is our unrivalled:

• APPLICATION EXPERTISE to develop tailor-made solutions in partnership with customers
• EXPERIENCE in Air Climate and Air Ventilation applications
• TECHNOLOGY & INNOVATION
• QUALITY
• LOCAL PRESENCE in 95 countries.

R&D Centres (Buildings)

- **Jönköping Sweden**
  air treatment and decentralized comfort
- **Toijala Finland**
  air diffusion and fire safety
- **Colchester UK**
  fans for buildings
- Pan European network for controls and communication

- **Competencies:**
  - Aerodynamics
  - Acoustics
  - Air Treatment
  - Air Filtration
  - Fluid dynamics and heat transfer
  - Controls and commu
  - Energy Efficiency
  - Hygiene in Air treat

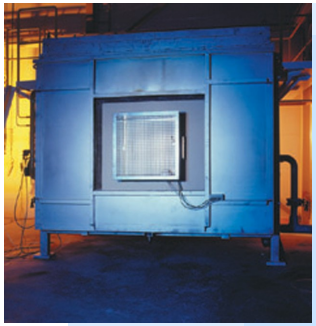
We have 65 and 165 engineers working on R&D and customer projects, respectively

Test facilities

Sound test laboratories

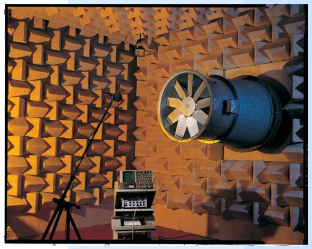
Numerous, on appr. 10 sites;

- Toijala FI
- Jönköping SE
- Colchester UK…



Fire test laboratories

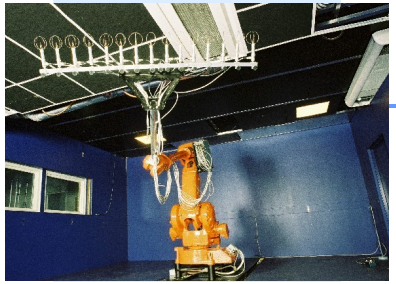
- Toijala FI
- Colchester UK



Fan test laboratories

Numerous;

- Växjö SE
- Jönköping SE
- Colchester UK…



Comfort laboratory

- Jönköping SE

Air treatment laboratory

- Jönköping SE

FläktWoods's Global Solution

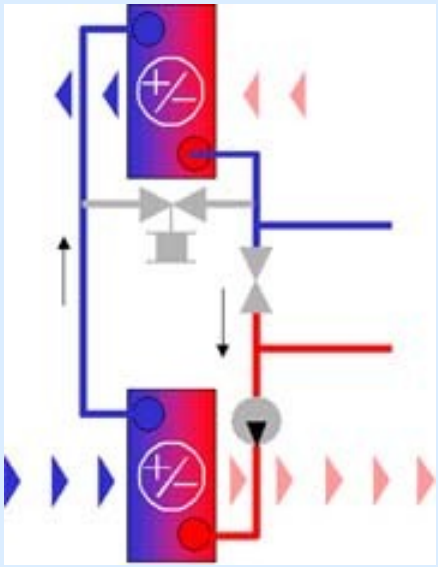
For the **Global applications**, requiring both a high technical expertise and relationships with global industry or global customers, our scope of supply varies from full systems to packaged products. We have an *unmatched application expertise and knowledge in:*

- Hygienic environment
- Cars parks and warehouses
- Fire safety in buildings
- **Energy efficiency in buildings and industry**
- Marine and offshore
- Tunnels and metros
- Industrial processes and water treat
- Cement and steel
- Pulp drying
- Motors and generators cooling

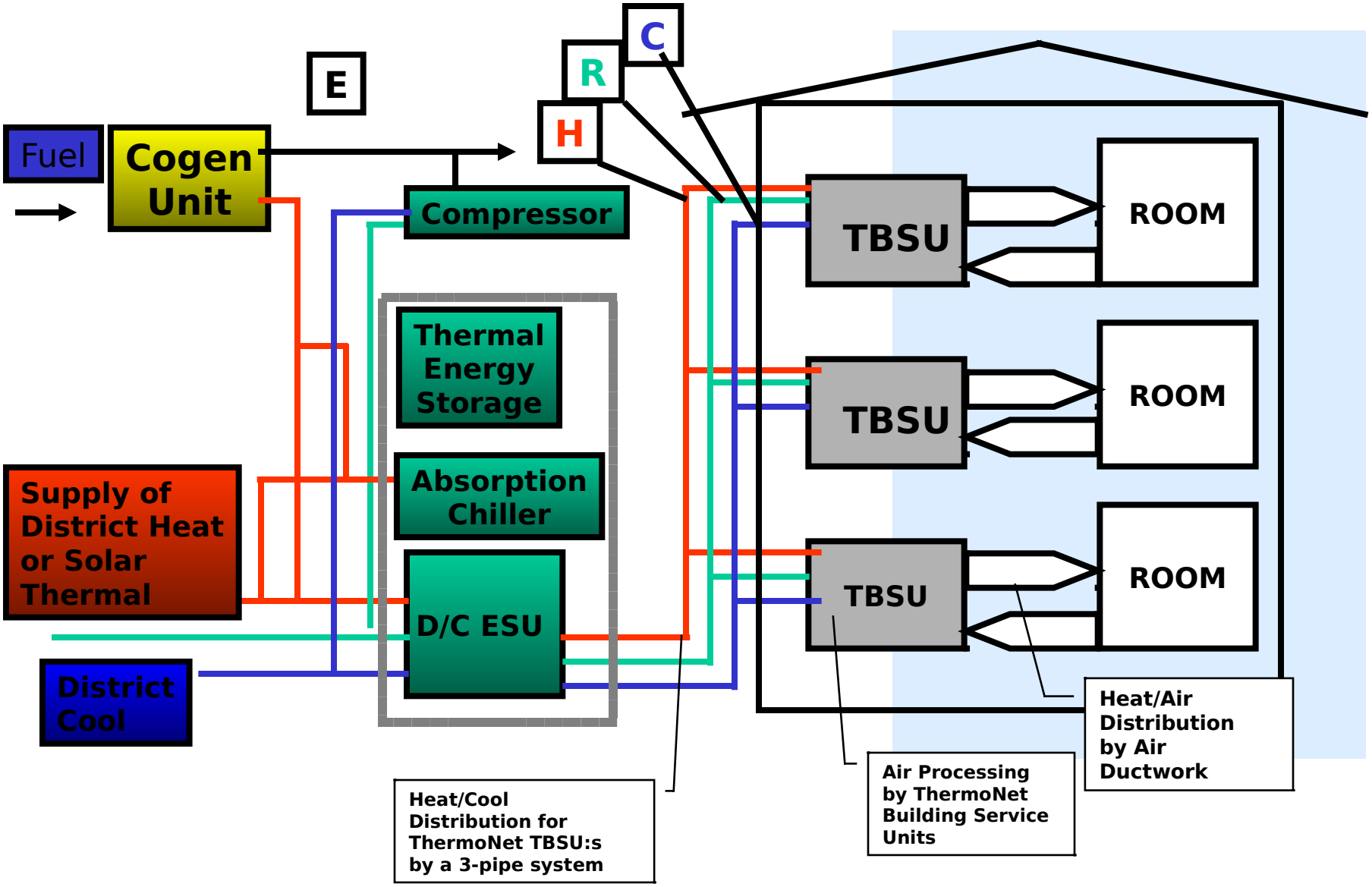
Whatever man-made construction in the world you might enter, someone cared for the ventilation there.
- And it's a good chance it was we who did.

Low Energy System ThermoNet-

- A system solution to rationalise energy use in buildings
- Utileses low grade thermal energies
- Based on system design and multifunctional heat transfer module in AH

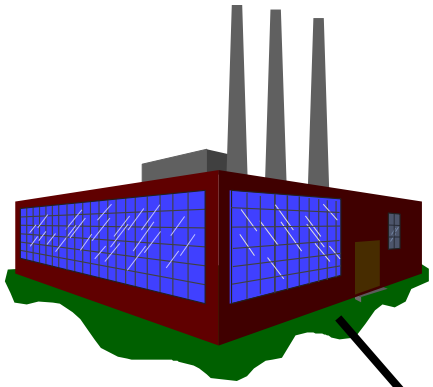


Total Energy Service Concept



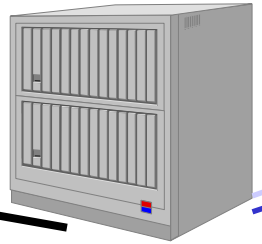
A District Cooling Concept

Cogeneration power plant produces electricity and heat

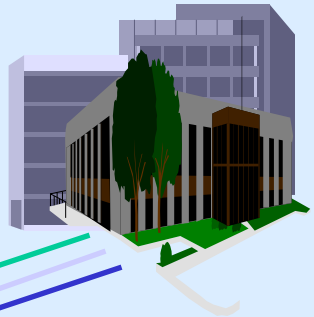


District heating net to the urban areas

ThermoNet® Energy Center produces cooling and heat for local distribution net



ThermoNet® Building Service System for Indoor Air Quality & Energy Management



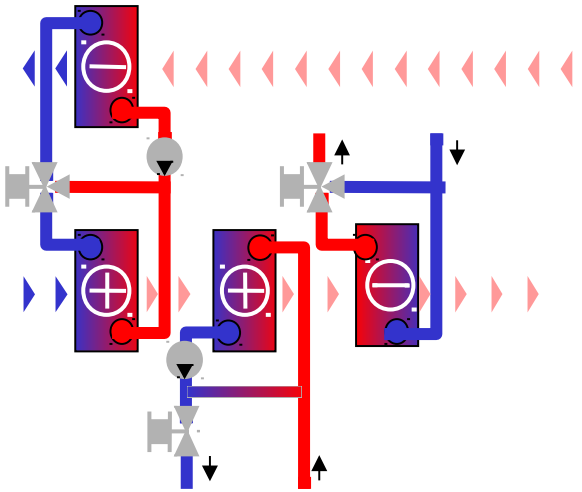
ECONET® -Innovation behind ThermoNet

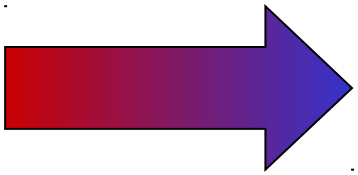
No leakage flow between supply and exhaust air.

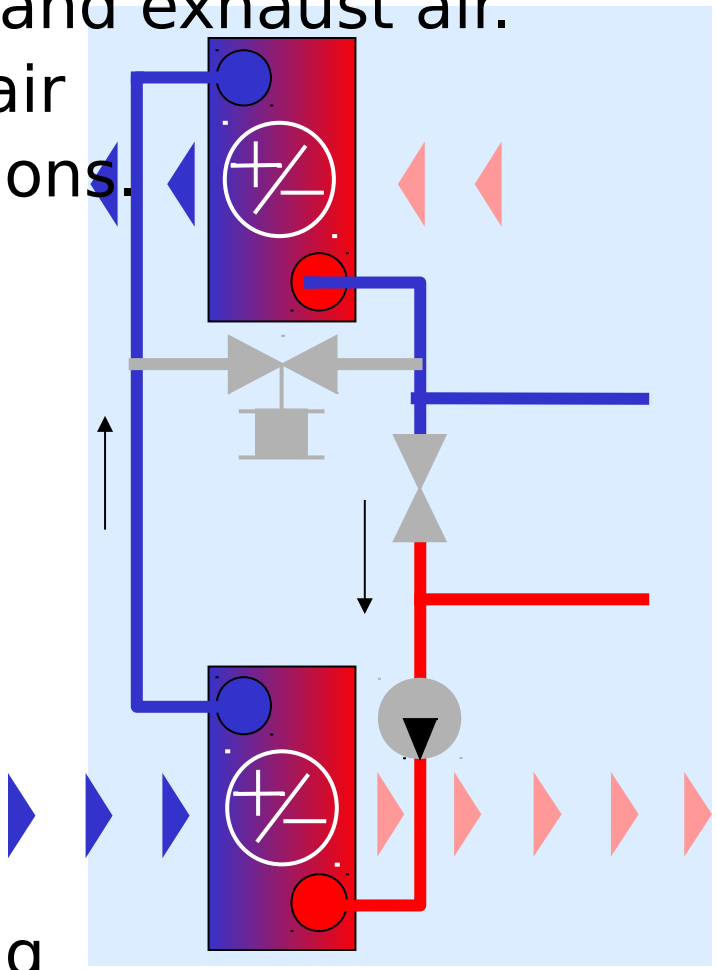
Separated supply and exhaust air units.

1 component, 3 functions.

Shorter AHU.







Increased heat recovery efficiency.

Possibility to utilize cooling recovery.

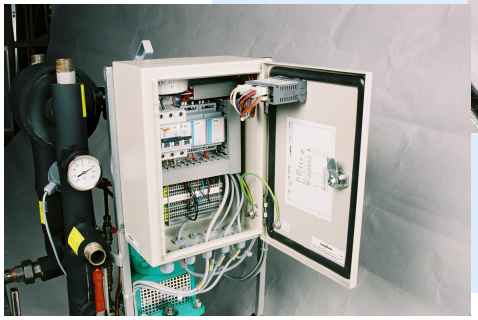
Possibility to utilize process/waste heat.

Perfect for district cooling/heating.

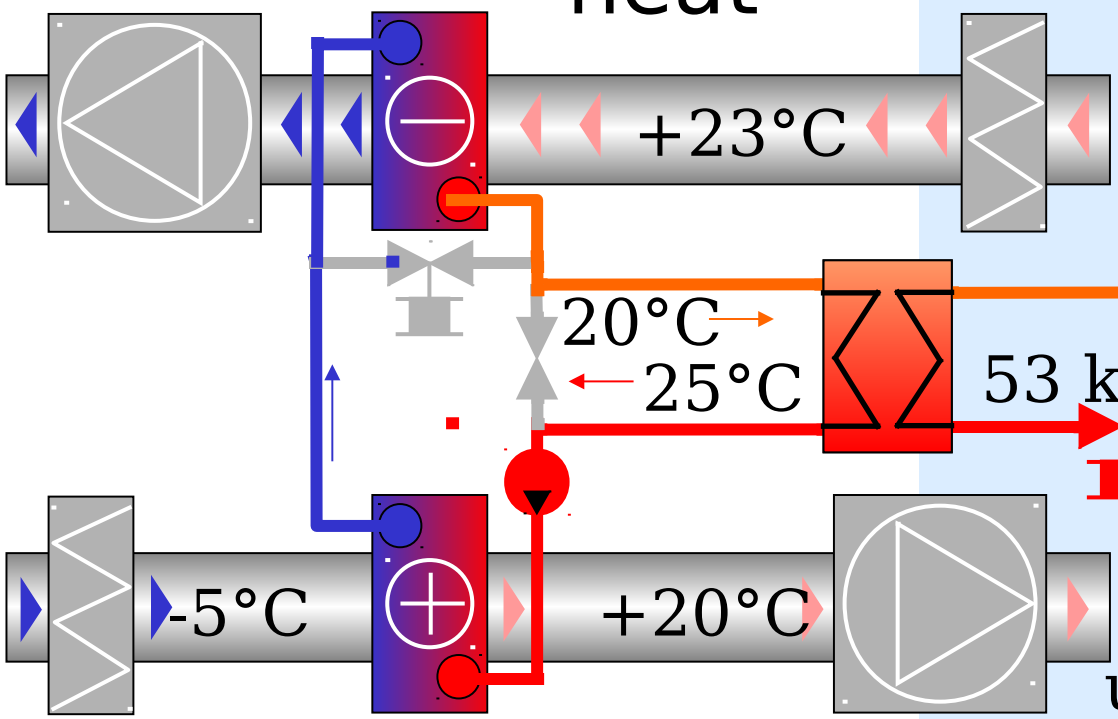
heart of ThermoNet systems

Basic functions:

- Indoor and out door versions.
- Liquid coupled heat recovery section.
- Heating and cooling of supply air integrated in the heat recovery section with heat recovery efficiency 60-75%.
- Control system for heat recovery.
- Pump unit with sensors for heat recovery section.
- Frequency converter for pump.



Possibility to utilize waste or condensate heat



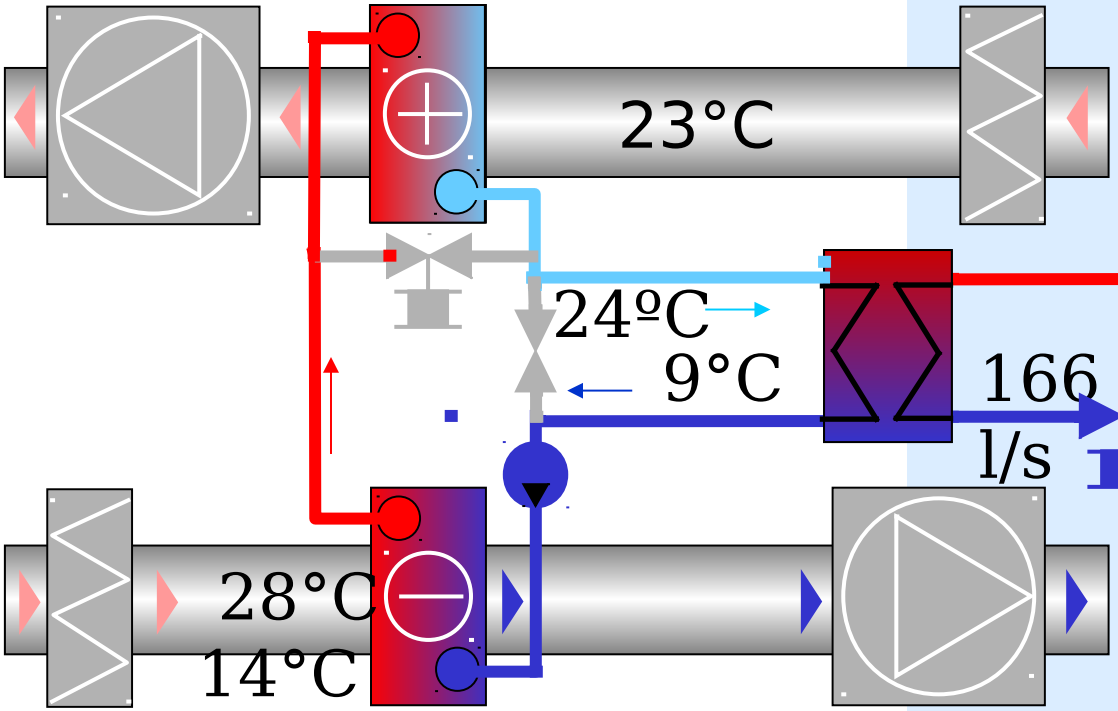
Low heating w
temperatures,
utilization of wa

condensate heat

Outdoor air temperature: -5°C
Airflow : ±8,5 m^3/s
Heat recovery efficiency : η = 70 %

Superior heat recovery

Superior for cooling + cooling recovery



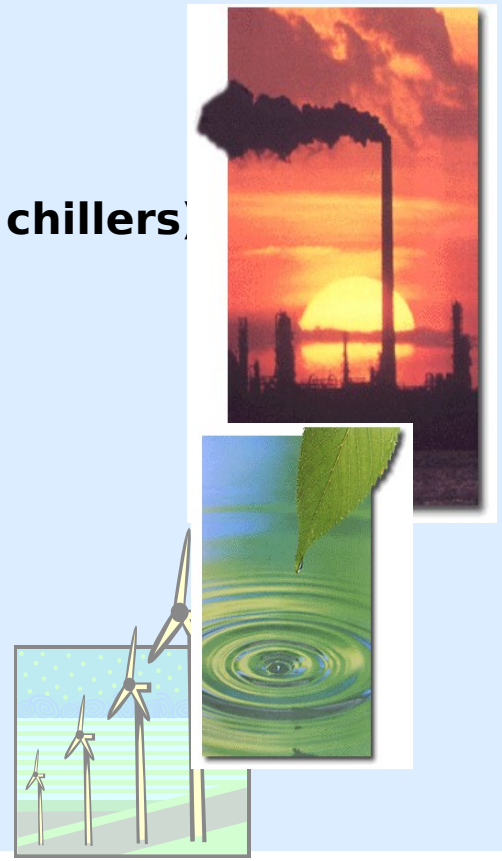
Outdoor air temperature: +28°C, 50 %

Airflow : ±8,5 m³/s

Reduced cooling power, due to cooling recovery (trad. 6/12°C ->

ECONET® applications

No leakage flow between supply and exhaust air. The air handling units can be separated from each other.



Supermarkets, shopping centres

- Utilization of waste heat (condensate heat from chillers)
- Easy to use cooling recovery
- High heat recovery ratio, 60-75%
- VAV system
- Smaller foot print for AHU

Hospital

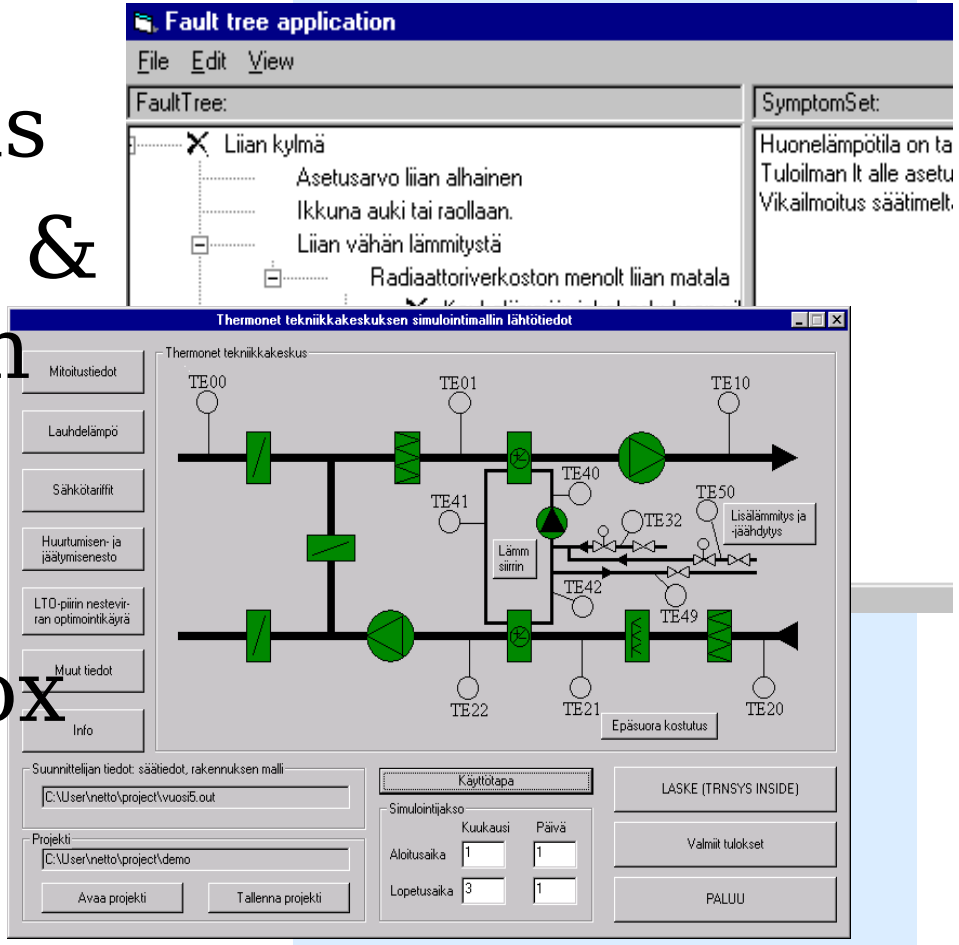
- Indirect heat recovery (coil to coil)
- Easy to use cooling recovery
- High heat recovery ratio, 60-75%
- VAV system
- Smaller and shorter AHU

Industry

- Utilization of waste heat (process heat)
- High heat recovery ratio, 60-75%
- Can be used with corrosive and polluted exhaust air

ECONET Tools

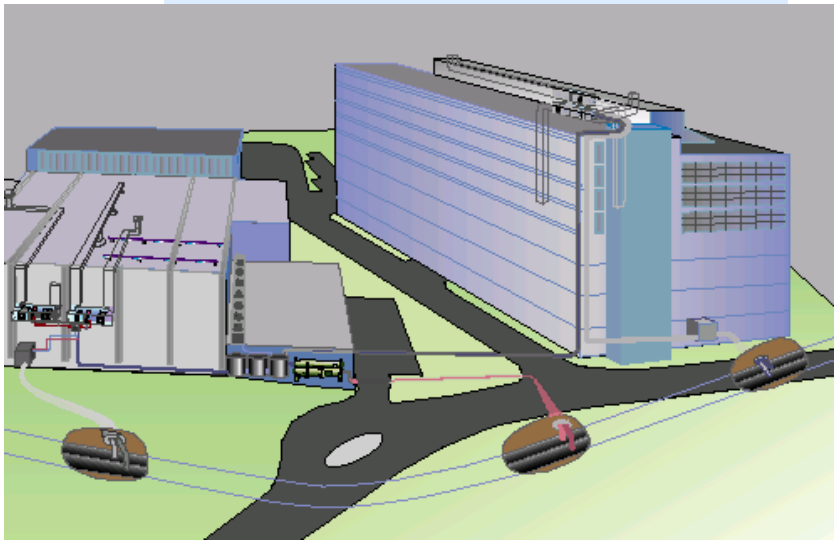
- Dimensioning Tools
- System simulation & Energy Calculation
- Life Cycle Assessment
- Diagnostics Toolbox



Advantages at the BES level

The advantages with the system are:

- Exceptionally low temperature requirement for hot water allows the
- Utilisation of alternative energy sources of thermal energy, e.g. solar thermal or geo thermal energy
- Higher COP of Chillers
- Ideal for district cooling/heating.



Business statistics

References:

Universities: Lund, Uppsala, Gothenburg - Sweden

IKEA: Helsingborg - Sweden

ICA Maxi Shopping Centre: Karlstad etc. - Sweden

Arla Food industry: Vimmerby - Sweden

Clinical Research Centre: Malmö - Sweden

Biomedicum: Turku - Finland

Åbo hospital TYKS: Turku/Finland

Shopping Centre / hotel: Oslo - Norway

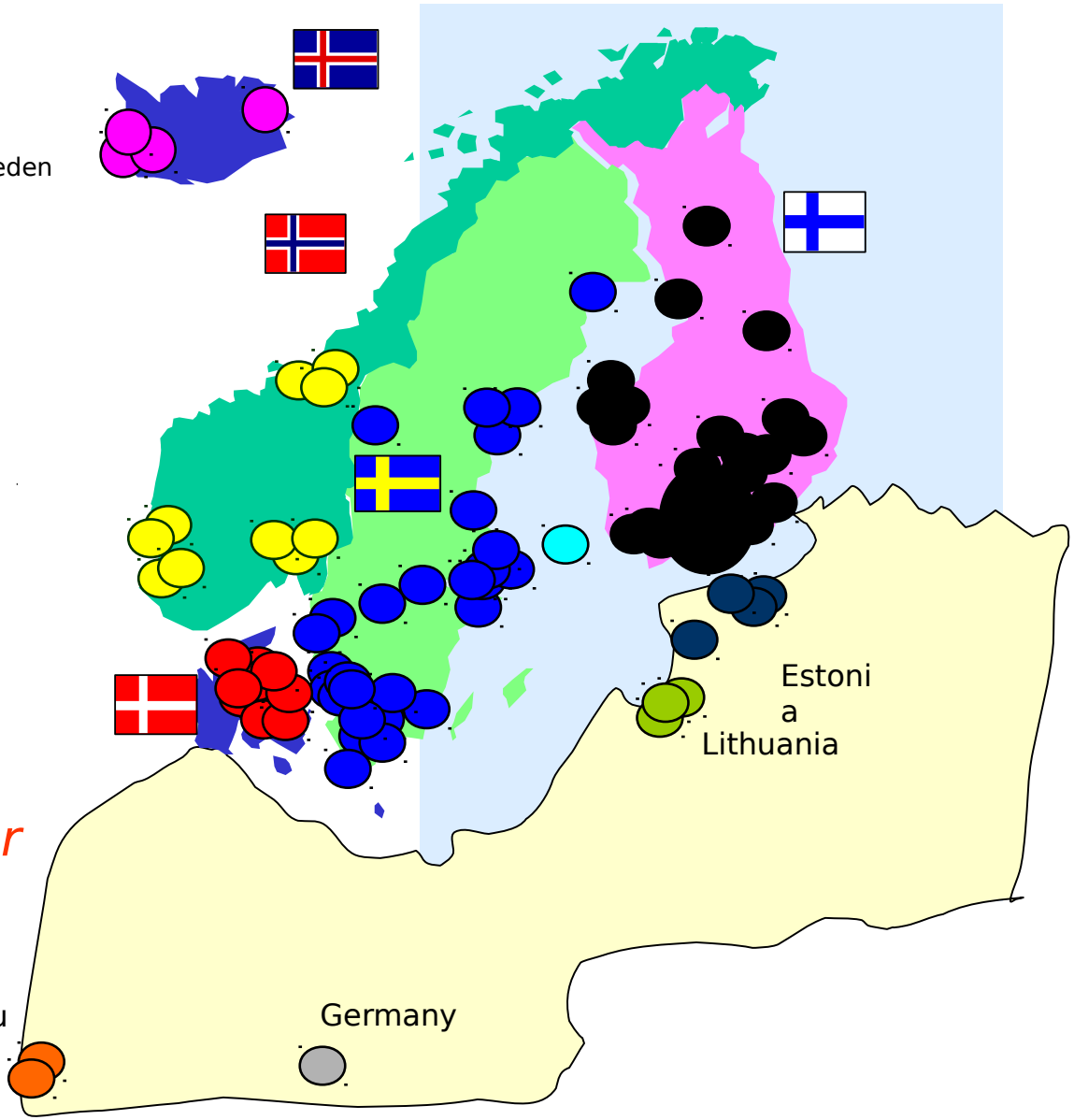
Hospital St Olav: Trondheim - Norway

Shell: Copenhagen - Denmark

NATO: Brussels - Belgium

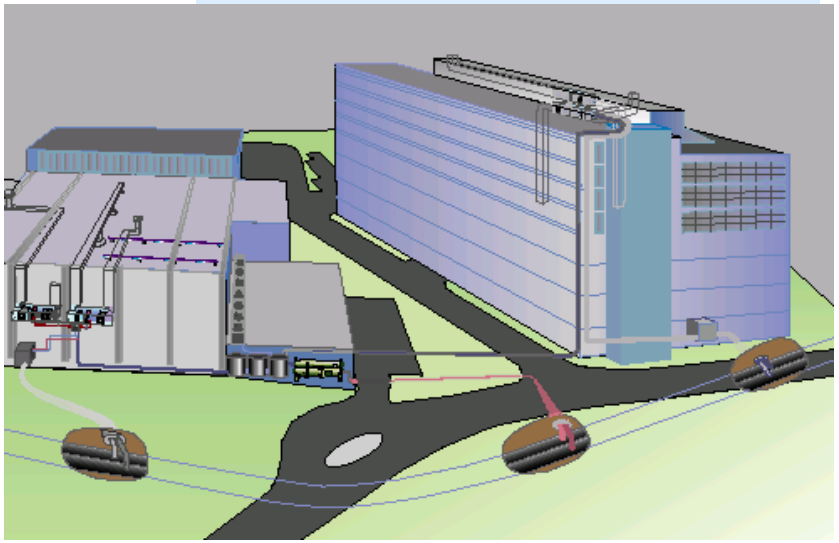
Music Hall, Tallinn - Estonia

Since the year 2000 over 500 systems have been sold.



Rewards

- ✓”Energia Hippu”- Award by the Finnish District Heating Association
- ✓“Air Movement Product of the Year” award at the prestigious Heating & Ventilation News Awards
- ✓EU Funding “DEMLOCS”



”We Bring Air to Life”

FläktWoods